Seat No. : _____

ZC-120

April-2014

B.B.A. Sem. IV

CC-210 : Business Statistics

Time : 3 Hours] **[Max. Marks : 70**

Instructions : (1) Attempt **all** questions.
(2) Use of Simple Calculator is permitted.
(3) Figures to right indicate full marks.

1. Answer the following : **14**

(i) Give one difference between Sample Survey and Population Survey.

(ii) Find the number of all possible samples of size n = 2 from a population of size N = 6 when sampling is with replacement.

(iii) The total area under the normal curve is _____.

(iv) For a normal distribution $\sigma = 5$, find the value of its mean deviation.

(v) Find area between the following standard normal value of z.

Between z = –1 and z = 2.4

(vi) A sample is said to be small sample if the size of sample is _____.

(vii) Define null hypothesis.

(viii) If the computed value of z falls in the critical region, the null hypothesis may be _____.

(ix) Define degree of freedom.

(x) Give one use of t-distribution.

(xi) Define χ^2-distribution.

(xii) A sample of size 20 drawn from a normal population gave Mean and S.D. as 40 and 6 respectively. Test the hypothesis that population S.D. is 8.

(xiii) Can we apply non-parametric tests for ANOVA ?

(xiv) Write down different methods of Non-Parametric test.

2. (a) Give the mathematical form of normal distribution. State its properties. **4**

OR

What is stratified sampling ? Give its advantages.

(b) The observations of a population are 16, 18, 19, 20. Taking all possible samples of size 2 without replacement, verify the following results : **5**

(i) $E(\bar{y}) = \bar{\gamma}$

(ii) $V(\bar{y}) = \left(\frac{N - n}{N}\right) \cdot \frac{S^2}{n}$.

OR

10 observations of a population are divided into two strata as follows :
Stratum – I : 2, 4, 6, 9, 11, 16
Stratum – II : 17, 23, 25, 27
Simple random sample of size 3 is drawn from the first stratum and that of size 2 is drawn from the second stratum. Find (i) $\bar{\gamma}$ and (ii) $V\left(\bar{y}_{st}\right)$.

(c) The weights of 4000 students are found to be normally distributed with mean 50 k.g. and standard deviation 5 kg. Find the number of students with weights : less than 45 kg. **5**

OR

Marks obtained by students in a 50 marks question paper follows normal distribution. If out of all students appeared in the examination, 56% students obtain 27 marks or more and 23% students obtained more than 43 marks, then find the parameters of normal distribution.

3. (a) Define the following terms : **4**
(i) Parameter
(ii) Type-I error
(iii) Two-tailed test
(iv) Critical region

OR

The mean of a sample of size 500 is 80 and S.D. is 16. Find 95% confidence limits for population mean.

(b) A random sample of 400 flower stems has an average length of 10 cm. Can this be regarded as a sample from a large population with mean of 10.2 cm and a standard deviation of 2.35 cm. **5**

OR

In a random sample of 200 persons of a town, 120 are found to be tea drinkers. In a sample of 500 persons from another town 240 are found to be tea drinkers. Is the proportion of tea drinkers in the two towns equal ? Use 1% level of significance.

(c) From the following data, test whether the difference between standard deviations is significant or not ? **5**

	Size	S.D.
Sample-I	1300	50
Sample-II	600	56

OR

In a random sample of 100 article taken from a large batch of articles, 10 are found to be defective. Obtain a (i) 95% and (ii) 99%. Confidence interval for the true proportion of defectives in each batch.

4. (a) Define t-statistic and give properties of t-distribution. **4**

OR

In an experiment with a new tranquilizer, the pulse rate of 12 patients was found to be reduced on the average by 7.2 beats with a standard deviation of 1.8. At the level of significance 0.05, can we conclude that on the average this tranquilizer will reduce the pulse rate of the patient by less than 9.0 beats ?

(b) The following results are obtained from two independent samples drawn from two normal populations. Test the hypothesis that population variances do not differ significantly : **5**

Sample	Size	S.D.
I	20	3
II	15	3.9

OR

A Random sample consisting of 4 students of Class XII is taken from each of the three different schools A, B and C, and a test on Mathematics is taken. The result of the test is given below :

School A : 71, 75, 65, 69
School B : 90, 80, 86, 84
School C : 72, 77, 76, 79

Make an analysis of the variance of the data.

(c) For two independent samples the following information is available. **5**

Sample	Size	Mean	S.D.
I	10	14	3.6
II	15	16	4.6

Test the hypothesis that population means are equal.

OR

Prices of shares of a Company on the different days in a month were found to be 36, 35, 39, 40, 39, 41, 40, 33, 34, 38.
Discuss whether the mean price of shares in the month is 35.

5. (a) Define χ^2 and give its uses. **4**

OR

The number of accidents on a highway during a week is given below. Can it be concluded that the proportion of accidents are equal for all days of a week ?

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
No. of accidents	10	18	9	13	11	8	15

(b) In an experiment to study the dependence of hypertension on smoking habits, the following data were taken from 180 individuals : **5**

	Non-Smokers	**Moderate Smokers**	**Heavy Smokers**	**Total**
Hypertension	21	36	30	87
No-hypertension	48	26	19	93
Total	69	62	49	180

Test the hypathesis at 0.05 level of significance that the presence or absence of hypertension is independent of smoking habits.

OR

A sample of size 7 is drawn from a normal population. The values are given below :
8, 14, 10, 10, 7, 12, 16

(c) Give advantages and dis-advantages of non-Parametric test. **5**

OR

Test the randomness of the following sample :
P Q P P P Q Q P Q Q P P Q P Q P P Q Q Q Q P Q Q P P P Q P Q P P Q Q P Q Q P P P Q Q P P Q P P P.

STATSTICAL VALUES

Area under SNC between

Z = 0	to	Z = 1.5	=	0.4332
Z = 0	to	Z = 1	=	0.3413
Z = 0	to	Z = 2.4	=	0.4918
Z = 0	to	Z = 0.15	=	0.0596
Z = 0	to	Z = 0.16	=	0.0635
Z = 0	to	Z = 0.74	=	0.2703

$t_{11, 0.05} = 2.201$ F(19, 14) 0.05 = 2.42

$t_{11, 0.1} = 1.796$ F(14, 19) 0.05 = 2.26

$t_{23, 0.05} = 2.069$ F(2, 9) 0.05 = 4.25

$t_{9, 0.05} = 2.26$ F(9, 2) 0.05 = 19.38

$\chi^2_{1,0.05} = 3.841$

$\chi^2_{6,0.05} = 12.592$

$\chi^2_{2,0.05} = 5.991$

$\chi^2_{19,0.05} = 30.14$